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# Aids to identification of flying objects

1003673

**This handbook has been prepared by laymen in the hope that it will provide guidance in the identification of flying objects which cannot be identified. Comments and suggestions for improvement will be welcome.**

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## SECTION I

### Flying Objects and Their Characteristics

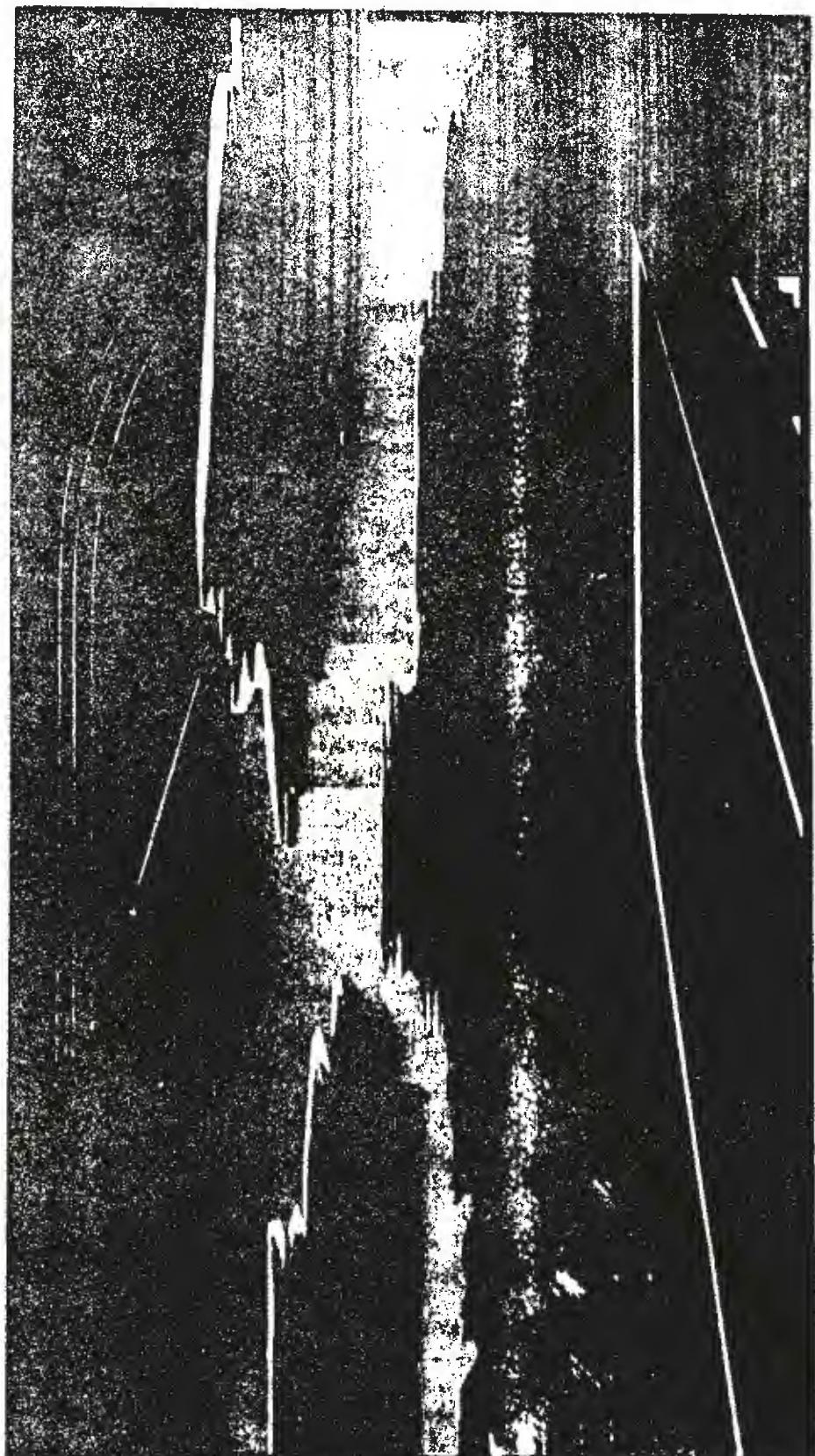
#### DEFINITION

Air Force Regulation 200-2 defines an unidentified flying object as any airborne object which by performance, aerodynamic characteristics, or unusual features does not conform to any presently known aircraft or missile type, or which cannot be positively identified as a familiar object.

Unusual weather or light conditions may transform many familiar objects into unidentified flying objects. The speed of the observer's aircraft and sudden climb or descent may produce distortions of vision which cause known objects to hover, perform erratic maneuvers, or glow and scintillate during hours of darkness. Many of these flying objects can be identified as follows:

- (1) Conventional aircraft observed from unusual angles.
- (2) Modern jet aircraft flying at great speeds and high altitudes.
- (3) Reflections of sunlight, moonlight, and starlight from aircraft and balloons at great heights.
- (4) Searchlight reflections on clouds.
- (5) Meteorological and upper air research balloons.
- (6) Meteors, comets, and stars.
- (7) Planets observed at certain times of the year.
- (8) Meteorological phenomena.
- (9) Cloud formations.
- (10) Birds, especially migratory formations.
- (11) Dust and haze.
- (12) Kites, fireworks, and flares.
- (13) Rockets.
- (14) Contrails.

A meteor, a comet, a balloon, or an aircraft, under certain conditions, assumes speeds, movements and shapes which are entirely uncharacteristic of the object under normal circumstances. Aircraft at great heights can appear wingless and projectile-shaped. Objects that appear to hover or move very slowly could be balloons. Flame-tinged, or brightly glowing objects, and those objects appearing to leave a trail of light in their wake may frequently be identified as meteors or comets. Another explainable phenomenon may be caused by the sun's illumination of vapor trails. Moving lights at night, or shiny objects in the daytime, traveling at moderately fast speeds, could be aircraft.



It has been characteristic of many reported observations of unidentified flying objects in the past that they have indicated at least some features of modern aircraft. There have been descriptions including rocket or jet pods, fins or rudders, windows or portholes, propellers, exhausts, etc. High speeds of modern-day aircraft lessen the possibility of detailed observation, and only certain prominent or familiar features of the flying object may stand out in the observer's memory.

### BALLOONS

Silvery, transparent, disk-like objects may be balloons. The absence of exhaust or engine noise, or any visible means of propulsion, would support such identification. Weather balloons are often released in clusters and may drift in what appears to be formation, depending on the air currents. They shimmer in reflected sunlight or moonlight, and seem to hover as they pass from one air current to another.

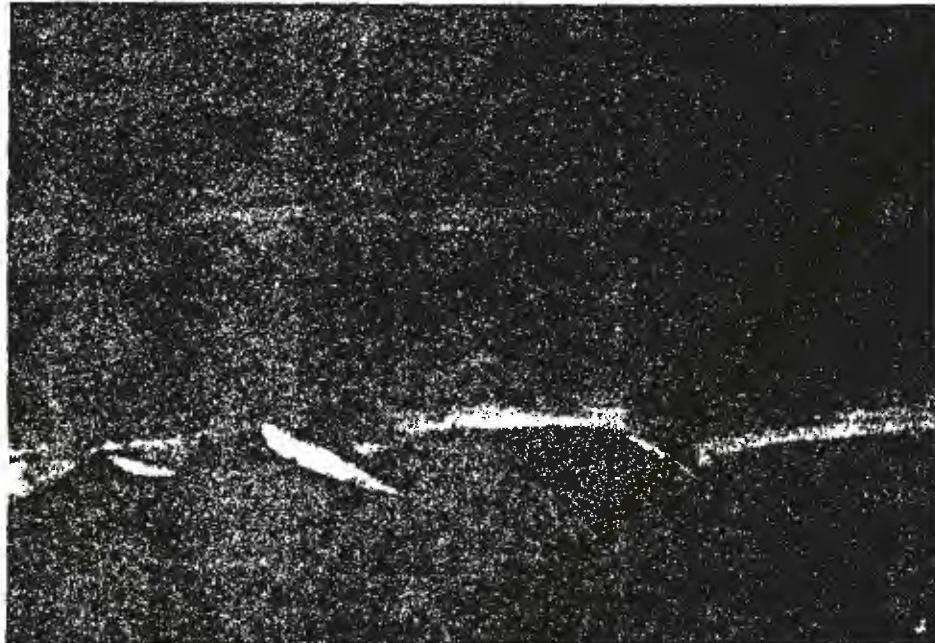
Upper air research balloons may attain great heights and travel great distances before they burst and fall back to earth. They may be observed, therefore, in areas far removed from any logical launching site. Research balloons are usually constructed of material with a highly reflective surface. They often approximate one hundred feet in diameter and are visible, under certain atmospheric conditions, even at extreme heights. Such balloons, seen in reflected light, may seem disk-like in shape and may appear to have an oscillating motion. They carry metallic equipment which can result in electronic contact.

An object usually is not a balloon if its speed is too fast. However, some balloons, such as those used for cosmic research, travel in the upper air currents at speeds often in excess of 100 miles per hour. In identifying a flying object as a balloon, it should be borne in mind that a balloon moves with the wind and not against it.

In the field of technological developments, new giant weather balloons are being launched to fly at 30,000 feet in an effort to learn more about atmospheric pressures, temperatures, wind directions and velocity over vast stretches of open sea. They will travel high above regular air routes and will be rigged to destroy themselves if they drop below 28,000 feet, or fail to go that high. These balloons are 40 feet in diameter and have a plastic skin only 2/1000ths of an inch thick. Flying at great heights over open water, and reflecting sunlight or moonlight from their plastic skin surface, these balloons could easily be mistaken for unidentified flying objects.

### ASTRONOMICAL BODIES

The estimated azimuth and elevation of a flying object can be checked to determine the known location of astronomical bodies. Meteors may be identified by conformance to size, shape and maneuvers described in Section 2, "Meteorological and Astronom-



What may appear to be an unfamiliar flying object soaring through the sky may actually be something tangible, such as this artist's concept of a large weather research balloon.

ical Aspects." During the month of March, the planet Venus is low on the horizon and is extremely bright. It can appear to change color and perform erratic maneuvers when viewed through thin clouds or haze. Meteors, on the other hand, do not pursue an erratic course. When the duration of observation of a flying object is extremely short, it is highly probable that the object is an astronomical sighting.

#### SHAPE

Shape is an important factor in determining the identity of a flying object. Distortion of shape, due to distance and darkness, enhances the difficulty of identification. Many of the strange shapes reported in the past would appear to be unidentifiable in terms of familiar objects, but in many instances could have been reflections from conventional objects viewed under unusual conditions. Light and shadow produce fantastic distortions, especially when objects are viewed at great distances and in varying degrees of gathering darkness.

An unidentified flying object may assume various shapes. The four most common shapes reported in the past are:

- (1) Elliptical or disk shape.
- (2) Aircraft shape.
- (3) Cigar shape.
- (4) Propeller shape.

This variety of shapes is an indication of individual reaction to what may have been familiar or conventional objects seen under unusual conditions, or created in the mind of the observer by his physiological limitations and psychological responses. Fatigue, unusual weather conditions, and the stress of flying at great speeds and high altitudes could induce such manifestations.

One report of an unidentified flying object stated that it was shaped like a conventional aircraft, but was luminous and surrounded by a red glow. This phenomenon could have been an actual aircraft reflecting light from some undetected source within or on the aircraft and glowing from an unusual play of moonlight or starlight on metal parts.

A disk-like object, with illuminated portholes, could be a conventional aircraft distorted in shape and stripped of wings by a temperature inversion mirage effect and reflecting light through apparently dual and convergent sets of windows.

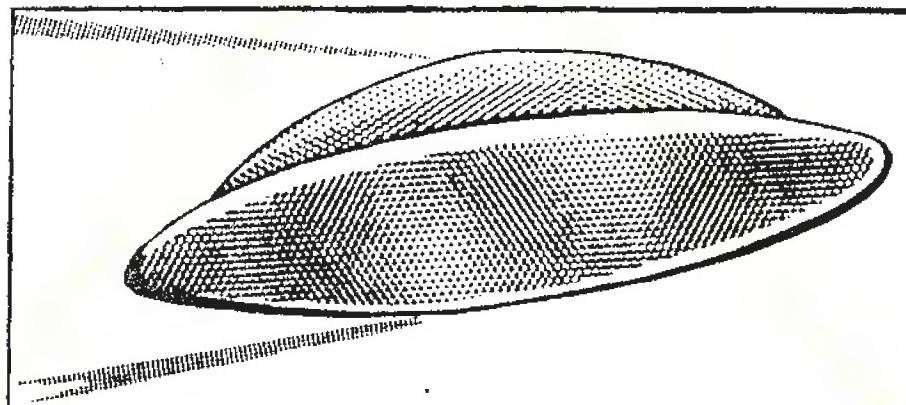
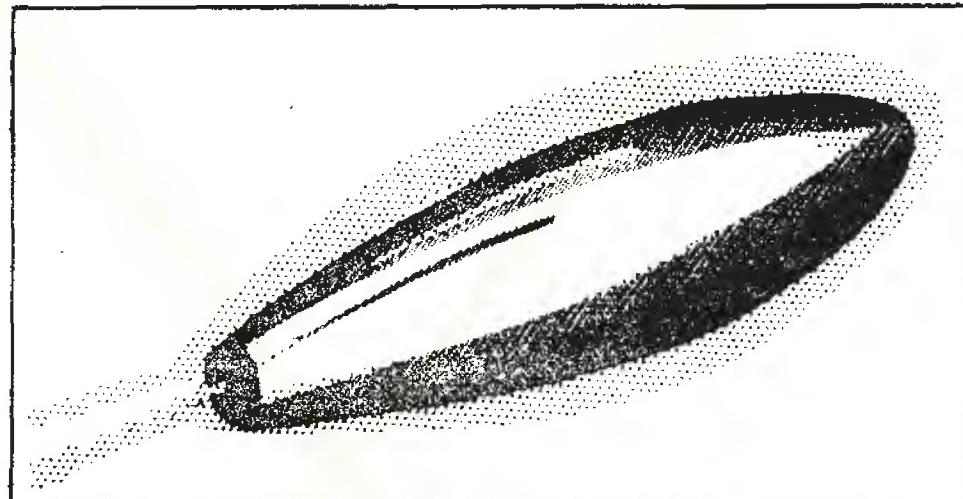
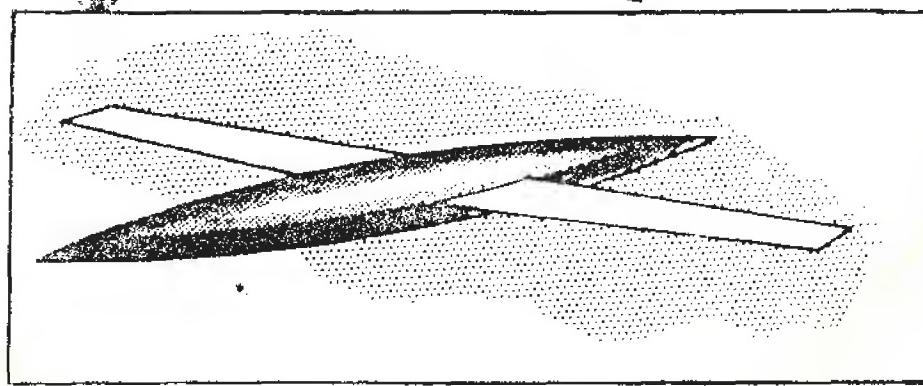
Transparent, cigar-shaped objects, illuminated from the inside and emitting an exhaust, could be jet aircraft at high altitudes where they appear wingless. The mirage effect of a temperature inversion could cause the apparent illumination and transparency.

Saucer-shaped objects, which hover and maneuver erratically, could be the planets Venus or Mars seen near the horizon at certain times of the year. When objects are viewed through haze or mist, the limitations of the human eye can produce what appears to be a hovering effect, or erratic movement.

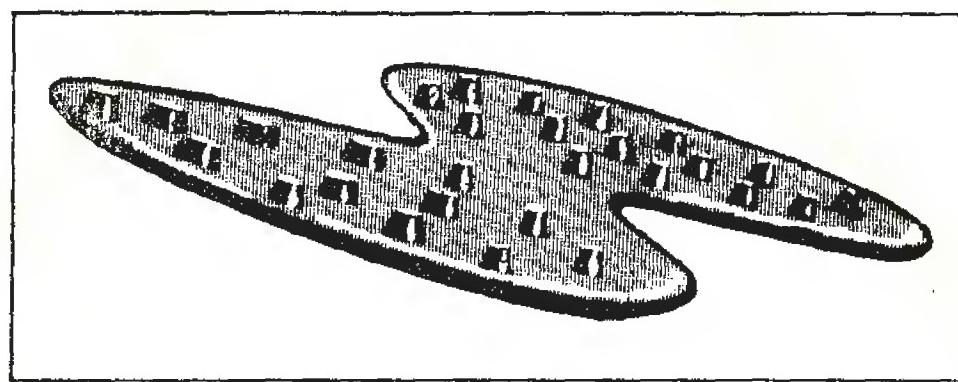
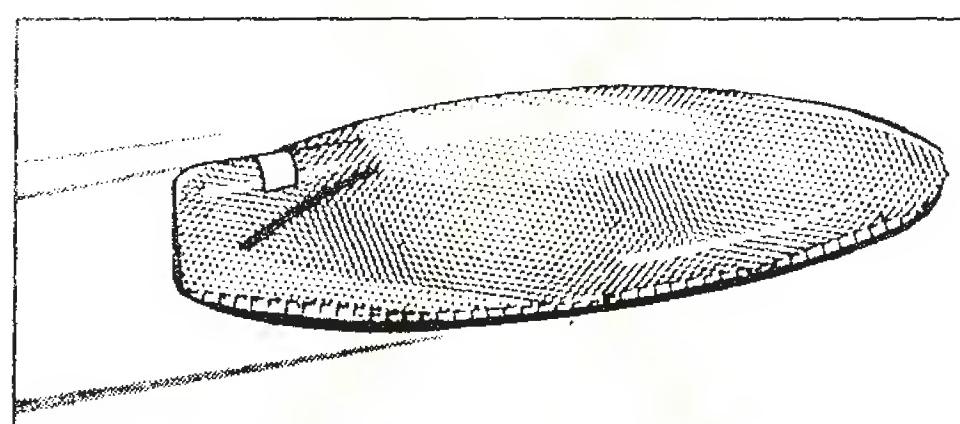
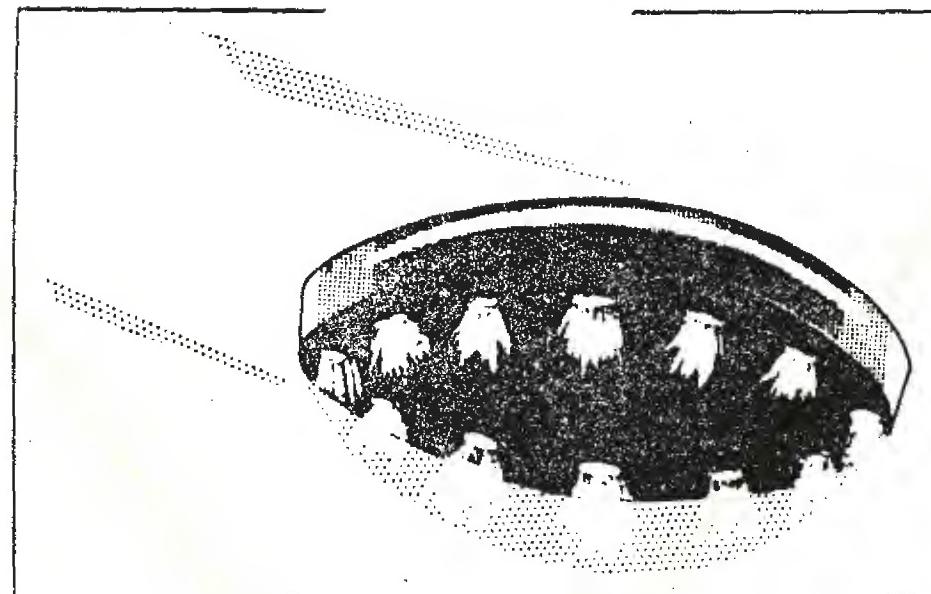
Propeller-shaped objects could be conventional or glider-type aircraft, distorted in shape by mirage effects caused by a temperature inversion.

#### RADAR SIGHTINGS

Radar sightings of flying objects frequently may be explained as ground targets reflected by temperature-inversion layer, or as radar echoes of various objects, not all of which are visible to the human eye. Most solid objects produce radar responses which are recognizable. Moving objects, such as aircraft and birds, normally can be identified by the size of the radar blip and by the speed, altitude, and type of movement measured by the radar set. The radar operator should be able to determine whether the responses noted on his scope are real, or are caused by the weather or other phenomena. A blurred effect on the radarscope may indicate a weather target, whereas a solid target, such as an aircraft, will be sharply defined.



These illustrations were reproduced on the basis of information from reports of sightings and are discussed in the preceding text.

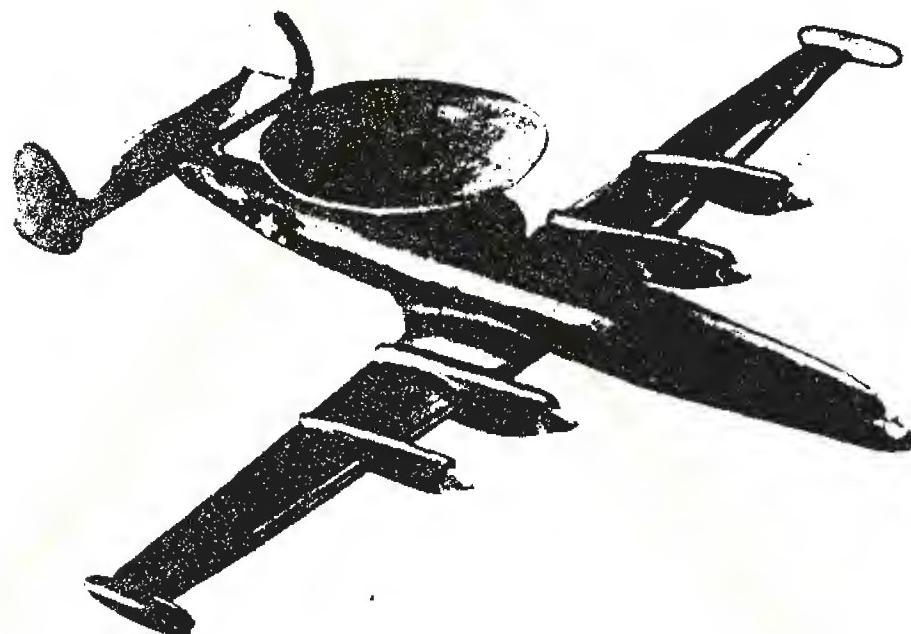


### NEW FLYING OBJECTS

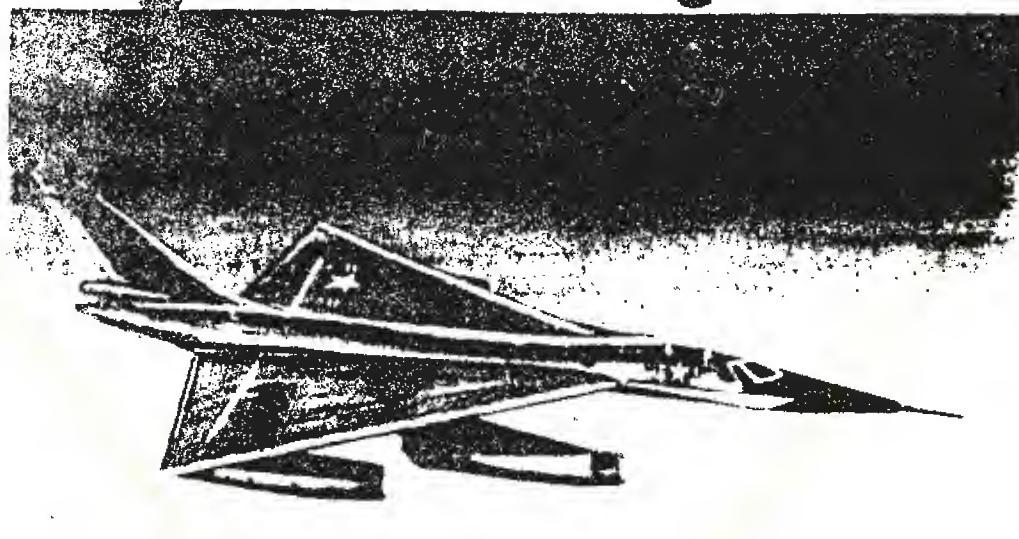
A new saucer-domed radar plane, now in the planning stage, is an example of an unfamiliar type of aircraft which, to the uninitiated observer, might appear to fall into the unidentified flying object category.

Technical advancements in the field of supersonic rockets to gather weather data offer possibilities for radar detection of apparently unidentified flying objects. Rockets will be shot into the stratosphere at 3000-plus miles per hour. At a height of 20 miles or more, their warheads will explode and release a cloud of metal foil fragments, which will be tracked by radar to learn wind velocity and direction.

The construction and successful launching of man-made satellites into the edge of space above the earth as part of the International Geophysical Year program, which began on 1 July 1957, may lead to reports of unidentified flying objects. The United States expects to launch a scientific data-gathering satellite in 1958 at the latest. At least one other country has announced intentions of duplicating this feat.



This new radar plane may easily be mistaken for an unfamiliar flying object, under unusual weather conditions, because of its unique configuration.



New USAF delta-wing jet bomber shows unusual configuration.

The satellite developed by United States scientists is a highly-polished, 20-inch sphere to be propelled aloft by a three-stage rocket. Its planned orbit is at a height of about 300 miles and is in the direction of the earth's rotation. Its course will follow a path that will permit its sighting from positions in Europe, North Africa and the Middle East. Although the satellite's size will appear minute at such an extreme altitude, its reflection will be visible to the naked eye under certain weather conditions. Its terrific speed will carry it from one horizon to the other, within the view of an observer, in less than 20 minutes.

Many new types of delta-wing aircraft are under development and some are in production at this time. Certain types are capable of vertical take-off. The unusual configuration of this aircraft lends itself to possible confusion with unidentified flying objects, and a vertical take-off might add to the observer's failure to identify it as a known object.

\* \* \* \*

Analysis thus far has failed to provide a satisfactory explanation for a number of unidentified flying objects. An understanding of some of the phenomena which may cause familiar objects to assume unfamiliar characteristics, together with an awareness of the many new technological developments which may be observed, should result in fewer sightings of this nature. Rational reporting will facilitate analysis of those sightings reported as unidentifiable.

## SECTION II

### Meteorological and Astronomical Aspects

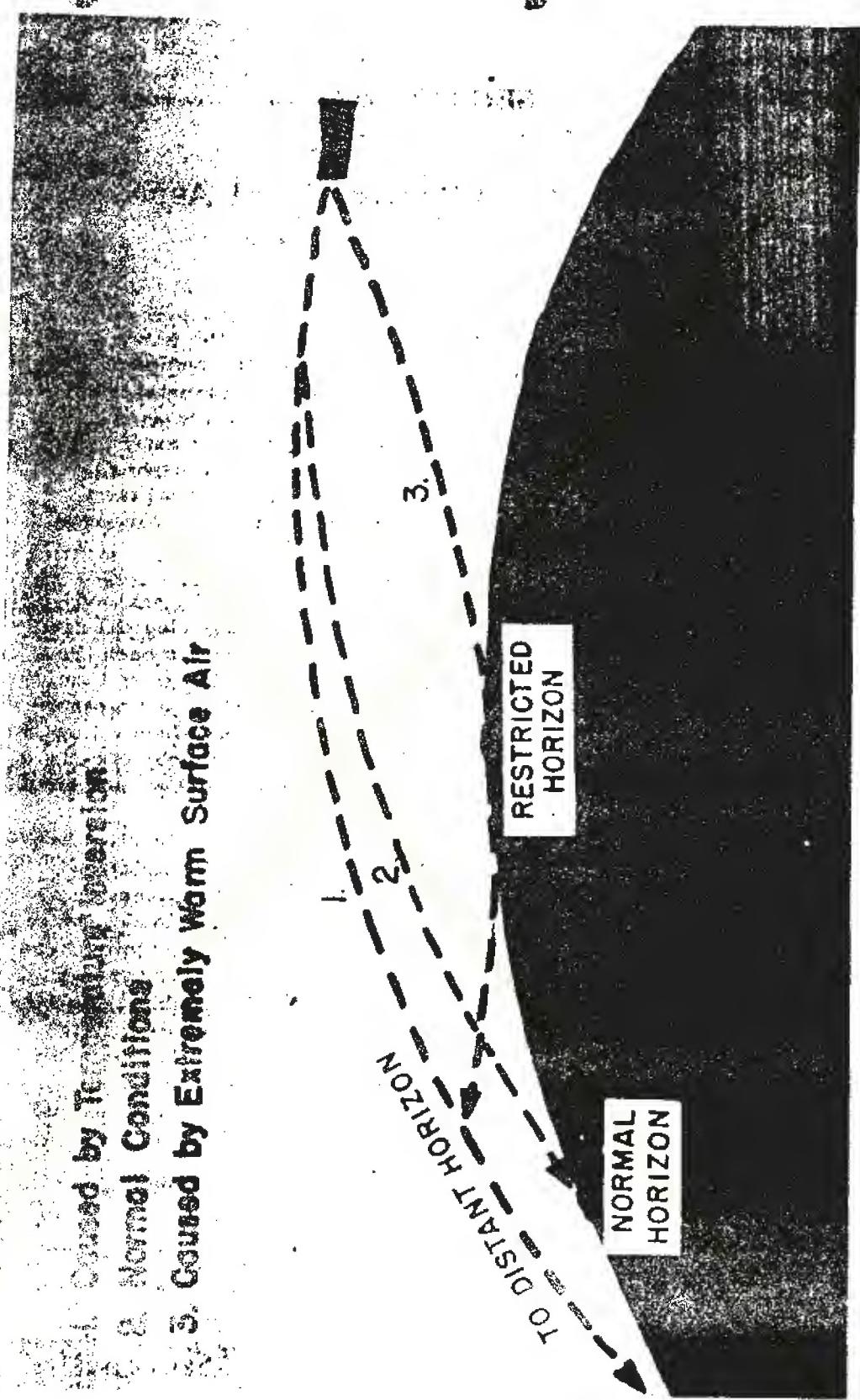
Scientists have been exploring the mysteries of the universe for many centuries and today know a great deal about the composition of the galaxy which includes the earth among its many planets, stars, and other celestial bodies. Yet, many questions remain unanswered and the search for more knowledge in the broad field of astronomy continues. The same is true regarding the earth's atmosphere, and, although considerably more is known regarding the natural laws which govern the sea of air around the earth, there are many aspects of meteorology that are not yet fully understood.

It is not unusual for the mind to become confused by garbled messages, caused by unusual astronomical and meteorological conditions and transmitted to it by the eye. Thus, the sky has been the setting for many strange sights which were not readily understood. Many may have been the result of unusual astronomical and meteorological conditions, which cannot be scientifically explained. However, many types of illusions which appear to be flying objects can definitely be related to astronomical and meteorological phenomena.

Under certain weather conditions, reflection and refraction processes can transform conventional aircraft, automobile lights, planets, meteors, and other identifiable figures into apparently supersonic flying objects of many shapes and colors. Clouds, haze, industrial smoke, water droplets and ice particles in the atmosphere are typical ingredients which make up atmospheric lenses through which many illusions of flying objects are seen. Car lights reflecting on clouds can create luminous disks which dart erratically through the sky at terrific speeds. Other light sources can produce similar illusions with appropriate variations, many of which even have specific colors provided by refraction of the light through water and ice particles in the atmosphere.

#### MIRAGES

One of the most common causes for optical illusions of distorted and displaced objects is the mirage. Warm air has a lower refractive index than cold air. The air is normally warmer at the surface of the earth and progressively cooler in a fairly steady gradient through higher altitudes. It is through such atmospheric conditions that distant objects are usually viewed and the mind becomes accustomed



to the impressions conveyed to it through the eye in this normal perspective. Light rays normally travel in a concave path that intersects with the horizon. When the normal temperature distribution is upset, the light rays bend accordingly and optical phenomena result. Causes of mirages follow two basic patterns:

(1) When the surface air is exceptionally warm, the air expands and becomes less dense, causing the convex path to shorten and, under extremely hot conditions, even to become concave.

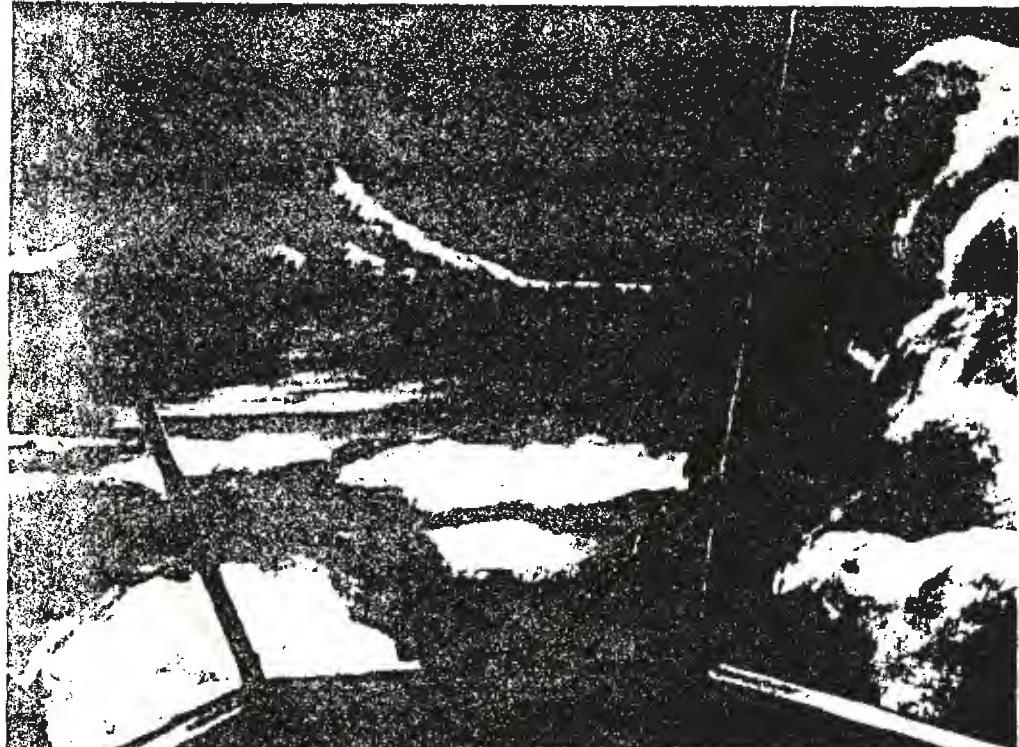
(2) Under conditions of a temperature inversion, with a layer of warm air over cold air, the path of light rays will lengthen to parallel the earth's surface at greater distances.

These abnormal conditions cause mirages and the eye will see unfamiliar or displaced and distorted images, which the mind is not immediately capable of interpreting correctly. Realistically proportioned mountains, cities and seas may be projected high into the atmosphere. On the other hand, land areas may be distorted and appear as separate images floating in the sky, giving the impression of suspended or flying objects. From an aircraft in flight, a cigar-shaped illusion of a land mass can change size drastically with changes of only a few feet in altitude of the observer's aircraft, thereby giving the illusion that the object is accelerating rapidly, traveling alternately at slow and extreme speeds, going away from the observer or coming toward him. The same is true at night in the case of objects formed by such light sources as search-lights, glow of lights from cities, automobile headlights, and celestial bodies. A temperature inversion can reflect the image of an aircraft to another location in the sky and mirror it as two aircraft, perfectly joined, with one aircraft inverted below the other.

The common mirage, based primarily on temperature distribution, is of course only one type of the numerous meteorological phenomena producing aerial apparitions. Others are caused by reflection and refraction of light through various atmospheric structures, such as different types of clouds, water droplets, ice and frost formations, haze, and smoke. Combinations of meteorological situations, and even combinations of meteorological and astronomical conditions, can produce startling effects.

#### REFLECTIONAL DISPERSION

Combined refraction and dispersion of the earth's atmosphere can cause a celestial body to appear to be at a different location in space and distort its normal color as well. When the object is low on the horizon, this condition is particularly prevalent. The planet Venus, for instance, may appear as bright red on the bottom and bright blue at the top edge, thereby giving the illusion of a flying



This snow-capped mountain, viewed from an aircraft, is actually a mirage, as described by a pilot who experienced the phenomenon. Under other type mirage conditions, land masses may appear as cigar-shaped flying objects.

object emitting red exhaust trails. An observer flying in an aircraft may easily mistake such an apparition for a flying object. As the aircraft moves through the atmosphere at an advanced speed, its position relative to the object naturally changes and the atmospheric conditions in line of sight between the aircraft's position and the object may change as well. The object thus may assume apparent characteristics of erratic behavior and fantastic shapes and colors.

#### PLANETS

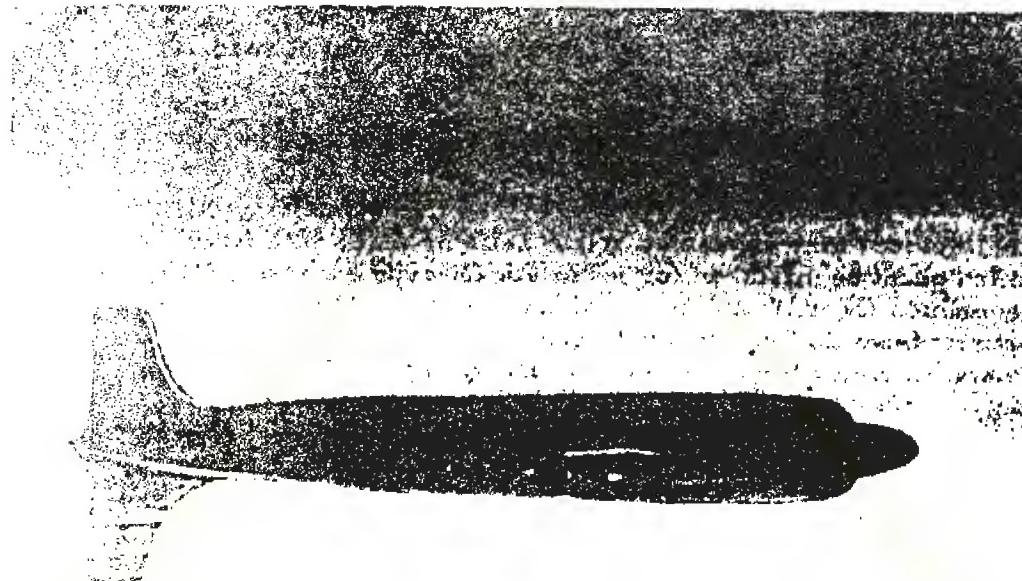
Although there are other planets that may resemble flying objects under certain conditions, Venus and Mars are most commonly mistaken in this sense. Venus is the brightest of all the planets and Mars is next. Venus, at its brightest, can be seen in daylight and can cast shadows after dark. This planet is a morning star from January to April, and an evening star during the remainder of the year. Mars is an evening star from January to September and a morning star the rest of the year.

In the past, both Venus and Mars, when low on the horizon, have been observed to change color and move at fantastic speeds, when viewed through haze or mist. Venus appears low on the horizon during the spring and is unusually bright. Mars has been reported to resemble a flying object when it was low on the horizon in early summer. If one of these planets is stared at for any length of time without any balancing point of reference, it can appear to perform erratic maneuvers. Thus, the planets of brighter magnitude in our galaxy provide a constant source of illusionary flying objects.

#### COMETS

Comets and meteors have their effect in the field of mistakenly-identified flying objects, although sightings of comets are rare simply because their incidence is so low.

Comets are nebulous bodies revolving around the sun for the most part in long ellipses. Although their periods are very uncertain, some few such as Halley's Comet, which pursues unmistakeable ellipses, can be expected to return. The nucleus of a comet, a minute disk of condensed light, strengthens in brilliance the nearer its orbit brings it to the earth. Some comets become bright enough to be discerned even in daylight. Since the long tail of the typical comet is composed of matter repelled away from the sun, it may either follow or precede the head, depending on whether it is approaching or going away from the sun.



Under certain atmospheric conditions, an aircraft, such as the C-118 portrayed here, can appear to be mirrored in its own reflection. The fantasy of this phenomenon may be further exaggerated by distortion through haze or mist.

## METEORS

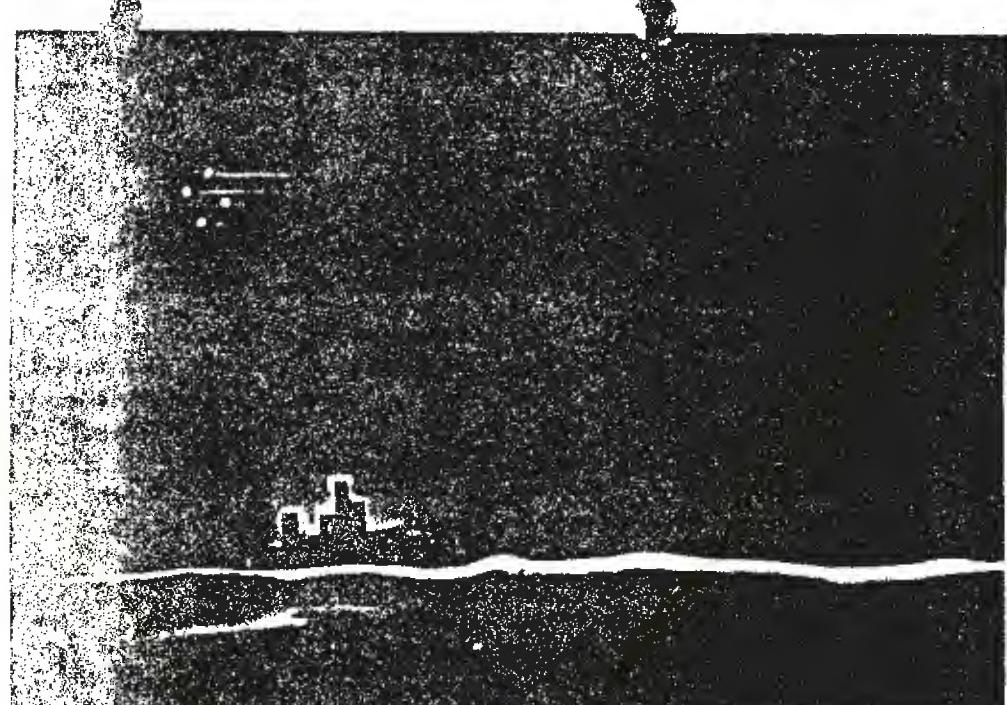
Meteors are particles continually entering the earth's atmosphere where they become so intensely heated they turn into incandescent gas. Theories on the origin of meteors are largely controversial; however, educated guesses range from dissipated comets to disintegrated planets. It is estimated that 24,000,000 meteors, which can be observed by the naked eye, enter the earth's atmosphere during a 24-hour period. These space particles are of various sizes, ranging from the microscopic to the rare ones weighing tons.

Bright meteors are known as fireballs. The ones which penetrate the lower parts of the atmosphere, where they explode with a noise like distant thunder, are called bolides. These are rare--probably no more than a few dozen appear over Europe during an average year. When a meteor, of such size that it is not entirely consumed by frictional heat after it enters the atmosphere, eventually collides with the earth's surface, it is called a meteorite. It is estimated that about 2,000 of these latter enter the earth's atmosphere during an average year.

The appearance and behavior of meteors streaking through the earth's atmosphere take on various fantastic forms, depending upon their size and composition and the meteorological conditions through which they are viewed. A meteor with the brilliance of the Pole Star can be caused by a particle no larger than a grain of sand. A particle no bigger than a pea can become a fireball. Examination of discovered meteorites reveals that most are irregular in shape; however, many become conically shaped in their passage through the earth's dense atmosphere.

Meteors may appear as bright balls or disks with fiery tails, which could be mistaken for jet or rocket-type exhausts. It is not uncommon for meteors to appear as flaming fireballs, with colors ranging from dull red to bright green, and they may even travel in clusters, giving the appearance of flying objects in formation. Meteors may also move relatively slowly and appear to follow a path parallel to the horizon, thereby giving strength to the illusion of flying objects.

Large meteors have long paths and may cross from one horizon to the other in the view of one observer and pass far beyond. They travel in the same direction as the earth in its orbit and their speed upon entering the earth's atmosphere varies. Those meteors overtaking the earth during evening hours may travel initially as slowly as seven miles per second, while those meeting the earth's rotation head-on during morning hours can be traveling more than 40 miles per second. Multiply these types of appearances and behaviors by complementary meteorological phenomena and the prospects for illusionary flying objects are considerably increased.



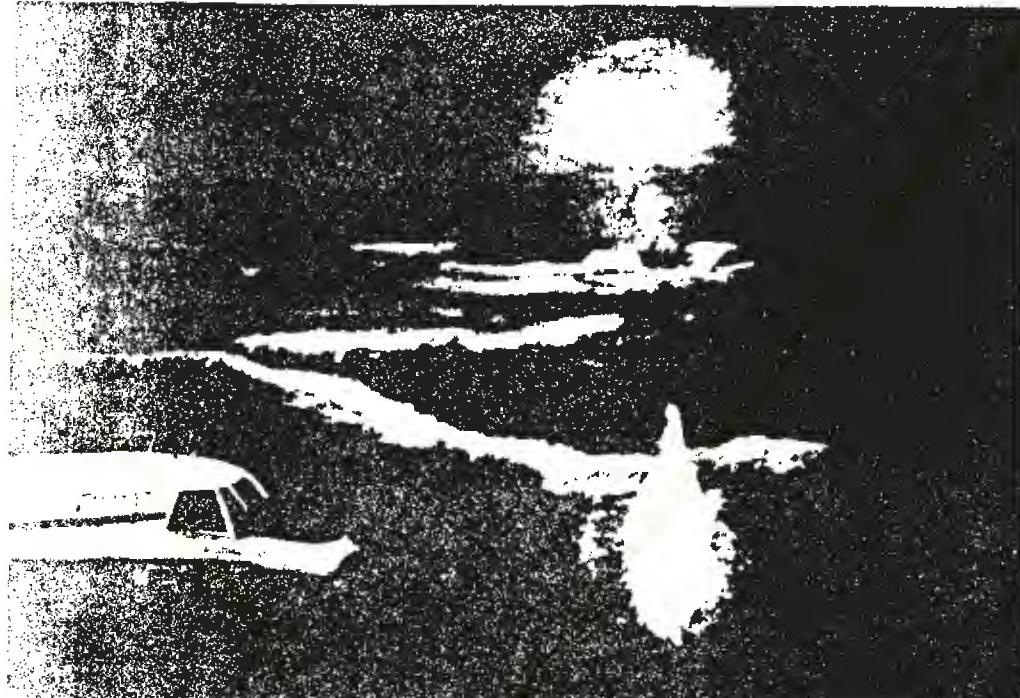
Artist's concept of actual meteor procession.

#### SUNDOGS AND MOONDOGS

The reflection of the sun in a layer of flat ice crystals can cause a phenomenon known as a sub-sun, commonly called a sundog. This apparition will appear at a point adjacent to the real sun and can be as brilliant as the sun itself. The sub-sun can develop a pattern of other sub-suns, causing a further complicated illusion. At night, the moon will reflect in the same manner under like meteorological conditions. This type of apparition is particularly discernible from aircraft at high altitudes.

The size and brilliance of sundogs and moondogs, and their behavior in relation to the observer's aircraft, will depend upon the location and density of the reflecting source, i.e., ice or frost-crystal formations, and, of course, upon the position and movement of the aircraft. The sundog or moondog may appear to chase the aircraft or fly in formation with it. If the aircraft turns toward the illusion, it may appear to slow down, speed up, and even come toward the aircraft head-on.

Cirrus cloud formations are effective viewing screens for illusions resulting from reflected or refracted light, as they contain ice crystals. These clouds exist in the upper atmosphere, so that conditions are favorable throughout the year for sundog and moondog apparitions. However, such phenomena usually are discernible at lower levels only during winter months in temperate zones.



A moon-dog might appear like this, viewed from an aircraft at two o'clock high from the one in the picture.

#### AURORAS

The aurora borealis, or northern lights, produces conditions and phenomena which have been associated with mistakenly-conceived flying objects. Auroral activity is associated with the earth's magnetic fields, explosions on the surface of the sun, and other solar activity. The auroral zone in the northern hemisphere follows roughly a circle around, and about 23 degrees away from the magnetic pole. In Europe, auroras are seen only infrequently below 50 degrees.

The aurora borealis cannot be seen in daylight, and during moonlit periods it is inconspicuous. It is sometimes bright enough to read by, and on rare occasions, its surface brightness surpasses even that of the moon. The most distinctive form of the aurora is that of a curtain or long wavy band, often with folds and flutings in it. Although the lower edge of the aurora is nearly horizontal, the band as seen from Europe would appear as an arc, due to its great distance from the observer. Auroras may consist of more than one curtain and may appear and disappear rapidly, remain constant for long periods, or move slowly across the sky. Some may appear merely as formless, diffused lighting in the sky. Faint auroras may appear colorless. Bright auroras are usually yellow-green, but other colors such as red, blue, grey and violet sometimes appear. A yellow-green curtain often will be tinged with red around its lower

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Auroras may appear high in the sky or low on the horizon, depending on the distance of the particular phenomenon from the observer.

While the chances of the aurora borealis itself being mistaken for a flying object are remote, the erratic lighting conditions it produces may often be a contributing factor to a sighting.

There are other phenomena believed to be associated with auroral activity which can produce apparitions resembling flying objects. Such phenomena occur during magnetic storms and probably are the result of gases emitted from explosions on the sun, and other solar activity. One such phenomenon, observed in northwest Europe, was described as a large brilliant disk which appeared on the east-northeast horizon and moved slowly across the sky, changing into an elongated ellipse, thence back to a disk before it disappeared below the opposite horizon.

This phenomenon was observed by many scientists who were out in force to observe expected auroral displays in connection with the magnetic storm they knew to be in progress. It is believed to have been caused by gases traveling through layers of the upper atmosphere in the auroral zone. Its color was described variously as white, pearly-white, greenish-white and yellowish-white. Calculations based on numerous observations of the phenomenon indicate that it may have been about 70 miles long by 10 miles in diameter.

This phenomenon occurred before the advent of the airplane and all observations were from the ground. However, a phenomenon of this size and brilliance could be seen for hundreds of miles from the air, and in myriad fantastic shapes and maneuvers if complemented by compatible atmospheric conditions. Official astronomical records reveal numerous equally fantastic illusions resulting from phenomena of this sort.

\* \* \* \* \*

The composition and structure of the earth's atmosphere and the space which lies beyond, and the natural laws which govern them, are complex. The foregoing is not an attempt to relate all apparently unexplainable aerial phenomena to meteorological and astronomical causes. Rather, it is a summation of the more important aspects of meteorology and astronomy which contribute to sightings of illusionary and real flying objects that cannot be identified readily. The information is designed to orient the potential observer in meteorological and astronomical conditions which affect human perception, thereby enabling him to understand the implications involved and report his sightings more rationally and lucidly.

### SECTION III

#### Radar Sightings

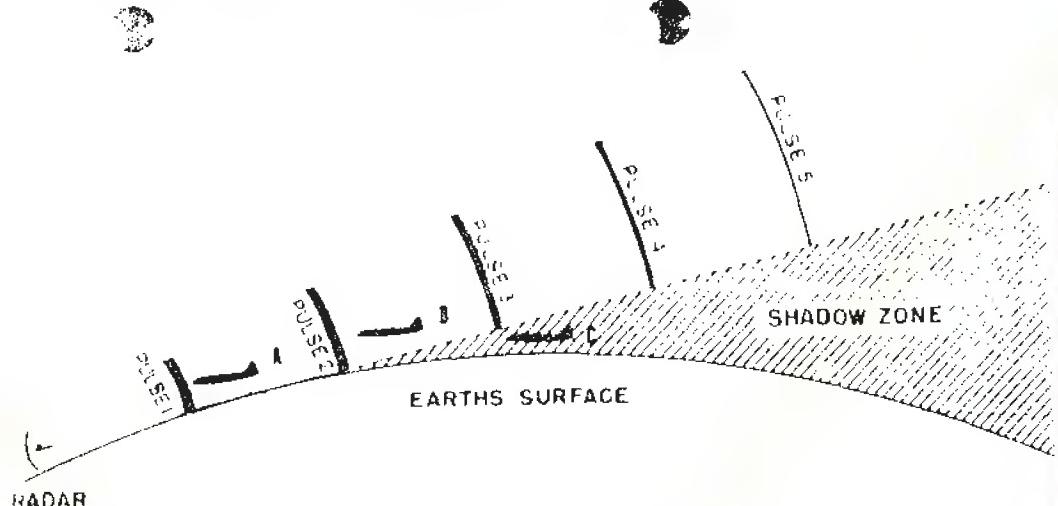
In certain instances, unidentified objects have been observed on radarscopes, both ground and airborne. Generally speaking these radar sightings fall into explainable patterns and are caused by certain meteorological phenomena, or familiar objects that are observed under unusual circumstances.

Radar echoes can be produced by a variety of objects, many of which are not visible to the human eye. A majority of solid objects which return radar energy produce responses on the radarscope that are easily recognizable. Moving objects, such as birds, aircraft and meteorological balloons, are normally recognizable by their size and velocity. However, some balloons, such as ionospheric balloons, ascend to altitudes above those of normal aircraft and travel with the upper air currents, sometimes at speeds above 100 mph. Radar returns from these balloons could give impressions of unidentified objects.

Certain meteorological and astronomical conditions will present radar returns that are unusual. Radar waves must travel through the earth's atmosphere where, like light waves, they may be bent by unusual temperature and moisture conditions. Radar waves may be refracted or reflected by atmospheric conditions to where ground objects may seem to represent an aircraft or flying object. Even with a moving target indicator, reflected images of distant ground objects may appear to be moving because of the movement of air layers.

Temperature inversions, in which a cold air mass is overlaid by a warmer air mass, can greatly increase the distance from which normal radar returns are received. Thus, objects may appear to be much closer than they actually are and these distant objects, superimposed on the normal radarscope picture, may result in misinterpretation and confusion.

Radar echoes may be produced by condensed water vapor in the form of raindrops, ice crystals, or snow. These radar reflections may cover a wide area which has diffused, irregular boundaries and fluctuating intensities. Movement of this water vapor will be determined by the movement of upper air currents, which travel at a speed of as much as 100 mph or more and at altitudes up to 40,000 feet. Normally, these patterns are easily recognizable by their size and radar return; however, they may appear confusing and result in false interpretations.



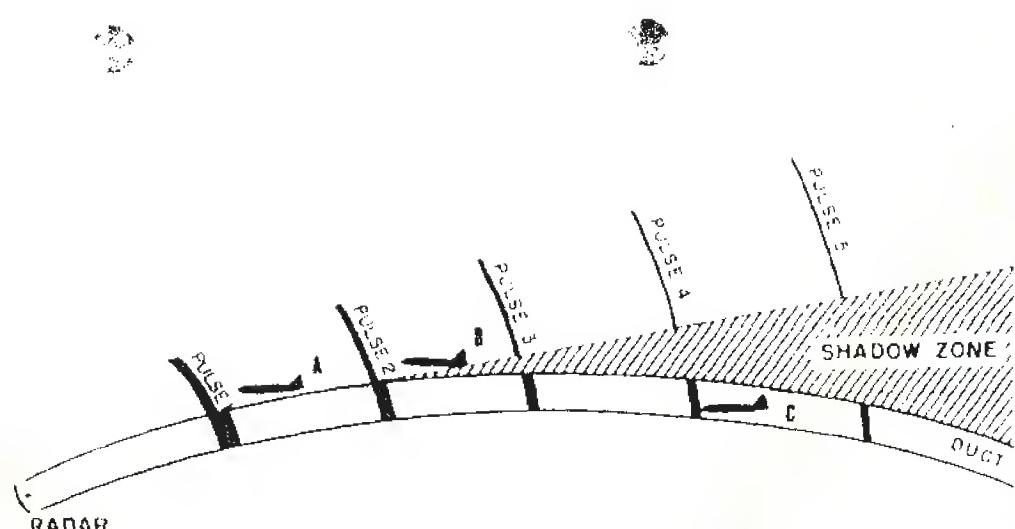
The transmission of a radar pulse, under normal atmospheric conditions, follows line of sight. Therefore the curvature of the earth would place Target "C" in the shadow zone.



The radarscope will show Targets "A" and "B" at normal range, but will not pick up Target "C".

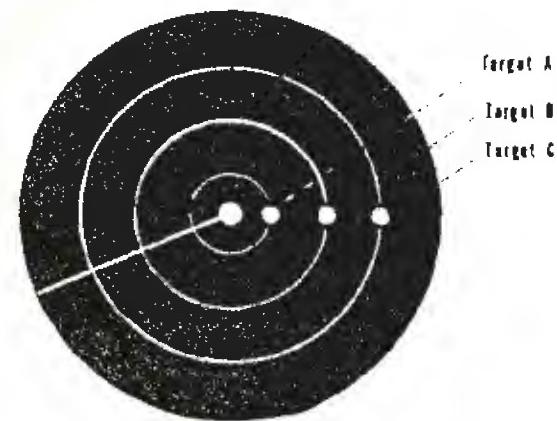
Meteors that enter the earth's atmosphere and get within range of radar may cause reflections that are extremely difficult to verify. Meteors reach the outer fringe of the earth's atmosphere at a rate of something near 100,000 miles per hour, although only a very few actually get within range of radar. Those that do, approach the earth from all angles and at velocities approaching 25,000 mph. Radar responses to these meteors may occur at any range or altitude, depending only upon the capabilities of the radar set. Radar reports resulting from this type of phenomenon can be verified by a study of the expected paths of meteors at the time of the incident.

In addition, there is the possibility that one radar set, which has characteristics similar to those of another radar set within range, may cause interference and unusual responses that could lead to confusion and inaccurate interpretation. Although this type of inter-



Under abnormal conditions, with cool air overlaid by a warmer air mass, a duct is formed through which the radar pulse travels and reflects Target "C" at a much greater distance.

The radarscope will show Targets "A" and "B" at normal range, but distant Target "C" will appear to be at much closer range than it actually is.



ference may cause the appearance of one or even two targets on the radar screen, it can generally be recognized quite easily.

\* \* \* \*

A careful study of unusual radar sightings will almost always disclose that the reason is explainable. Experience in the operation of radar will provide the operator with the ability to recognize most unusual phenomena when they occur. However, occasionally a verification of meteorological or astronomical data may be necessary to substantiate the validity of what otherwise might be considered an unfamiliar flying object.

## SECTION IV

### Physiological Aspects

Physiological factors may have profound effects upon an individual's ability to observe and to interpret observations accurately. One of the greatest hindrances to human understanding can result from deception of the senses. The sense of sight is, by itself, purely a physical process and the perception and understanding attached to visual sightings is determined largely by memory of past experiences and familiarity with surrounding objects. This relation of experiences to the interpretation of visual sightings permits many errors.

This margin of error may be applicable particularly to aircrew members operating high-performance aircraft, under adverse or unusual weather conditions, under tension, and during periods of extreme fatigue.

The aircrew member is generally familiar with many of the unusual observations associated with meteorological and astronomical phenomena. However, many unusual observations are the result of certain physiological effects that may be unknown or unfamiliar.

Occasionally, objects that exist on the surface of the eye may be mistaken for distant objects. These objects take various forms. Tiny specks of dirt may appear as shimmering globules of light and, if a speck is illuminated by an outside light source, it may appear as a large, out-of-focus blob of light. If this speck is viewed against a dark sky or background, it may be quite spectacular. As this speck floats across the pupil of the eye, it will create the appearance of movement.

Many reported unidentified objects, described as flying saucers, glowing disks, shiny spots or a string of pearls, are nothing more than minute blood capillaries on the surface of the retina of the eye, or tiny corpuscles, which become visible under special conditions of illumination.

Another physiological phenomenon is that of after-image. A sudden flash of light affects the retina of the eye and causes a dark image to remain visible for some time after the light has been extinguished. Flashes of lightning, comets, or meteors will cause this effect and may be confused and interpreted as unidentified flying objects.

Hypoxia, resulting from lack of oxygen, has varying effects on the ability to react and to observe accurately. The effects of hypoxia may vary much in the same manner as those of alcoholic intoxication. Usually vision is affected, reactions are retarded, and observations are distorted. An oxygen mask leak may cause alternating stages of hypoxia and normalcy, with the individual often being unaware of these changes.

In a series of tests conducted at the USAF School of Aviation Medicine to determine the effects of fatigue, it was discovered that extreme fatigue may cause an individual to hallucinate, imagining that he sees a variety of unusual objects, and with a vividness to make them seem quite real. Fatigue, even in minor degrees, will slow down reaction time and reduce ability to observe and interpret observations.

Two phenomena that occur frequently are those of authypnosis and autokinesis. In both of these reactions, a stationary light will assume apparent movement. In authypnosis, this reaction is caused by continued attention to an external light source. Autokinesis is the result of observing a stationary light under circumstances in which relation to familiar objects is absent.

There is strong evidence that a great many visual problems, both physical and physiological, arise as a direct result of flight at high altitudes.

When flights are conducted at relatively low altitudes, the visibility of distant targets will be reduced by atmospheric haze. This is because light emanating from objects in space is gradually attenuated by absorption and by primary and secondary scattering along the pathway of sight.

Along with the variation of the contrast by atmospheric interference, there is a shift of the apparent contours. This has been disclosed by experiments performed at the USAF School of Aviation Medicine. From these studies, it was concluded that the apparent angular size and apparent distance of objects depend on the brightness reduction of the atmosphere. With increasing altitudes, the deviation of the apparent luminance from the actual luminance of an object in space will result in the object's appearing brighter than it actually is. This may result in false identification of a normally familiar object.

\* \* \* \* \*

The physiological effects enumerated above are but a few of the manifestations resulting from known reactions. Many physiological effects resulting from high-performance flight are still in the category of unknowns. However, these factors greatly influence one's ability to understand and interpret sensory reactions. If recognized by the aircrew member, they may aid in identifying unfamiliar objects in flight.

## SECTION V

### Psychological Aspects

Reasoning ability, degree of susceptibility to suggestion, and general mental attitude are vital factors in identifying and reporting flying objects. Failure to note details accurately and a tendency to overdraw descriptions of sightings can result in failure to identify. An over-active imagination, coupled with physiological strain, can transform unfamiliar meteorological or astronomical phenomena and light aberrations into unidentified flying objects.

Perception and feeling are closely related and can have a marked effect upon understanding. Motivation in many instances determines how we interpret what we see, and expectancy can induce manifestations which are only indirectly related to actual physical phenomena or objects. The separation of what may be observed through the senses from what is known through thought or intuition is difficult, inasmuch as understanding is derived from a combination of both. However, an objective attitude, which permits assessment of observed characteristics, rather than suppositions or theories, will assist the observer in avoiding distorted descriptions.

It has been suggested that the world each of us knows is a world created in large measure from our experience in dealing with our environment. When two points of light, one brighter than the other, are placed at an equal distance from an observer in a dark room, the bright point of light looks nearer than the dim light, if one eye is closed and the observer remains motionless. The direction from the observer, as well as a difference in brightness, will result in an apparent variance in distance. Should two equally bright lights be placed near the floor, one about a foot above the other, the upper light will appear to be at a greater distance from the observer than the lower one. Conversely, when the lights are placed near the ceiling of the room, the lower light will appear to be farther away.

When two partly inflated balloons are illuminated indirectly and fastened in positions about one foot apart, where their relative brightness and inflation can be controlled, the observer will experience a variety of reactions as to what he saw.

If the brightness and size of the two balloons remain the same and the observer views them with one eye at a distance of approximately ten feet, he sees two bright spheres equidistant from his position. If the relative sizes are changed and the brightness remains the same, the larger balloon usually appears nearer. When

the size is changed continuously, the lighted balloons seem to move back and forth, giving the effect of erratic movement of lighted spires through space. This is true even when observed with both eyes. If the relative brightness is varied constantly and the size remains the same, a similar effect is obtained. When there is a variation in relative size and brightness, most observers are inclined to judge distance by relative size rather than by relative brightness.

The effect of these tests upon the observer is premised on the fact that he draws upon past experience in assessing distance based upon relative size and brightness. He assumes that, since the two points of light appear similar, they are identical and of equal brightness. Therefore, the point of light which seems brighter must be nearer. In the case of the two points of light placed one above the other, past experience leads the observer to assume that, when he looks down, the lower light is nearer and, conversely, that, when he looks up, the higher light is nearer.

With regard to the seeming variance in distance when the size of objects is changed continuously, rarely has the observer seen two fixed objects at the same distance change in size. Usually any change in size of an object results from a change in the position of the object in relation to the position of the observer. As the object draws nearer, it becomes larger, and the reverse is true as it draws farther away. Therefore, in the case of the two balloons, the observer assumes that any change in size of the two balloons results from a variation in distance from his point of observation.

These experiments show how misinterpretations can result from the relation of visual perception to past experience in an effort to understand and recognize the object or objects seen.

When we see an object, we derive an impression not only of its location, but also of its existence as an object, and the location as related to visual perception will color the characteristics it possesses. Objects seen through haze or mist, or in reflected light, will assume characteristics they do not possess normally, but, because they have been perceived visually, the observer tends to accept them as real. Thus, psychologically, he creates an object with characteristics which do not exist in actuality. It is essential, therefore, that the observer analyze his observations in relation to unusual weather or lighting conditions and reject characteristics which deviate from the normal and can be explained by the unnatural conditions under which they were seen.

When we see an unfamiliar object, we draw upon our individual past experience in an attempt to identify it. If the unfamiliar characteristics of the object cannot be related to past experience, we have a feeling of uncertainty and it is then that we draw upon imagination in an effort to relate visual perception to understanding. Imagination is colored by suggestion and herein lies an inherent danger.

We are open to suggestion constantly in our daily lives. Advertising media, artists' concepts, modern-day science fiction, propaganda, exaggerated film versions, publicity on perpetrated hoaxes, and the imaginings of zealots and fanatics all react upon the consciousness in the form of suggestion. When we seek an explanation for the unusual or unfamiliar, and attempt to draw upon imagination instead of rationalization, suggestion influences our thinking.

\* \* \* \* \*

Physiological changes due to fatigue and intense strain enhance the susceptibility to suggestion and may induce psychological manifestations which a more rational state of mind would reject. The observer should attempt to evaluate his observations. Objective analysis of those characteristics he has observed, in relation to the conditions under which they were seen, will assist in identification of the unfamiliar object and result in more accurate reporting.

## SECTION VI

### Visual Perception

Since visual perception supplies the first awareness of a flying object, it is important to know "how to see." Knowing "how to see" will facilitate identification and reporting of flying objects. The following aids to "seeing" to the best advantage are provided from Air Force Manual 51-7, "Your Body in Flight."

#### SKY SEARCH

It is a common misconception that the eye "takes a picture" of everything within its field of view. This is not true. Pick out any word in this sentence and then move your eye to the next and then the next. You will discover that you can no longer read the first word after having moved your eye about 5 degrees.

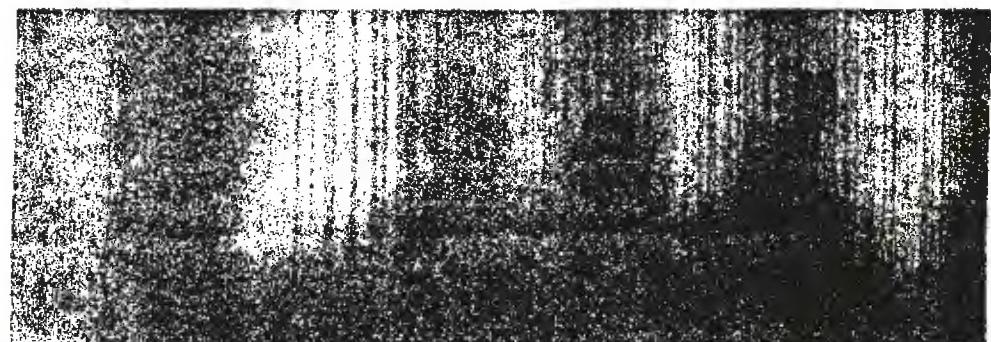
You see best in daylight and the eye sees by moving in short jumps. It is not a sweeping but a jerking motion with which you see details around you. This is of the utmost importance to the combat pilot scanning the sky for the enemy. Experiments have shown that the eye sees nothing in detail while it is moving. It sees only when it pauses and fixes an object on its retina. In scanning the sky, do not deceive yourself that you have covered an area with a wide, sweeping glance. The correct way to scan is to cover an area with short, regularly-spaced movements of the eye. The scanning pattern followed depends, of course, on your position in the airplane.

#### DEPTH PERCEPTION

Judgment of distance is done subconsciously in a combination of ways: Close up, we depend on binocular vision, each eye seeing an object from a different angle. At distance beyond binocular range, which is usually the case in flight, we judge it on a one-eye basis. Examples of methods of depth perception follow:



Binocular vision



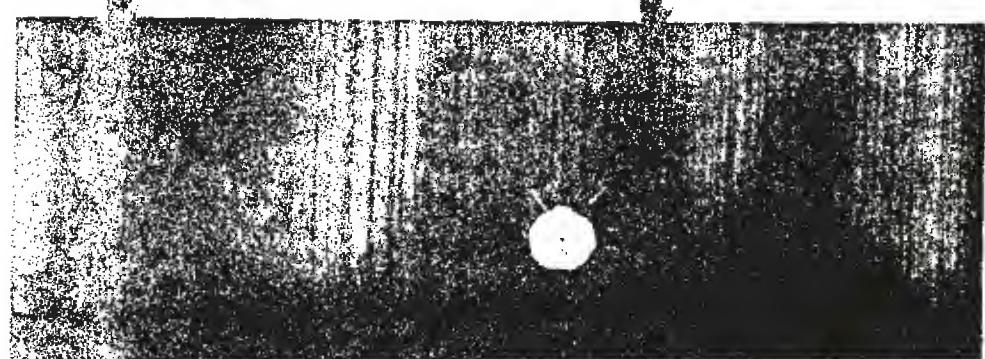
From the known size of an object and how much of our visual field it fills.



From our knowledge of perspective and the convergence of parallel lines at a great distance.



From overlapping — an object overlapped by another is known to be farther away.



**From light and shadow** — an object casts a shadow away from the observer if the light is nearer.



**From aerial perspective** — large objects seen indistinctly apparently have haze, fog, or smoke between them and the observer and therefore are usually at a great distance.



**From terrestrial association** — objects ordinarily associated are judged to be approximately the same distance.



## ACCOMMODATION



The eyes change focus to see objects within about 20 feet, but do so almost not at all for distant objects.

## SEEING AT NIGHT

It is easy for your eyes to play tricks on you at night when you stare for some time at a light - say, the tail-light of a lead airplane. What happens is technically known as autokinetic movement, or more commonly as stare vision. If the light is stationary, it may seem to move and swing in wide arcs. If the light is moving, it may seem to move to the side when it is actually going straight ahead. The cure for stare vision is don't stare - keep shifting your gaze from point to point.

Another common illusion at night is to see a light expanding or contracting at a fixed distance from you when actually the light is approaching or going away. Again, shift your gaze.

One last tip on seeing at night is to keep your windscreens scrupulously clean. Dust, grease, water droplets, scratches, and the like all obstruct your view, night or day. Many a speck on the windshield could, after a few hours, take on the silhouette of "an unidentified flying object."

With regard to color perception at night, blue and green lights are seen most easily; red and orange are seen least easily.



From motion parallax - When the observer fixes his sight on one object while his head or body moves, other objects apparently moving in the same direction as he are judged to be more distant, while those apparently moving in the opposite direction are judged to be nearer.

## SECTION VII

### Reporting

In reporting flying objects, there are certain major characteristics which should be noted. These include:

- (1) Number.
- (2) Shape.
- (3) Color.
- (4) Speed.
- (5) Acceleration.
- (6) Size.
- (7) Altitude.
- (8) Sound.
- (9) Light brightness.
- (10) Maneuver characteristics.
- (11) Range.
- (12) Direction.
- (13) Initial and final elevation.

Certain variable factors, such as the observer's position or movement during the sighting, speed of observer's aircraft, the position of the sun relative to the observer, the angle of elevation of the sun above the horizon and its bearing from true north as seen by the observer at the time of sighting, and the duration of the observation are important in determining final identification of the flying object.

An estimate of the number of feet at which an object is traveling above the aircraft's altitude may be substantiated by using the range capability of the radar gunsight.

Air Force Regulation 200-2, dated 12 August 1954, establishes procedures for reporting information and evidence pertaining to unidentified flying objects. The reporting format includes the following factors, which will serve as a guide to the observer in assessing the characteristics of flying objects:

(I) Description of the object(s):

(a) Shape.

(b) Size compared to a known object (use one of the following terms: Head of a pin, pea, dime, nickel, quarter, half dollar, silver dollar, baseball, grapefruit, or basketball) held in the hand at about arm's length.

- (c) Color.
- (d) Number.
- (e) Formation, if more than one.
- (f) Any discernible features or details.
- (g) Tail, trail, or exhaust, including size of same compared to size of object(s).

- (h) Sound. If heard, describe sound.
- (i) Other pertinent or unusual features.

(2) Description of course of object(s).

- (a) What first called the attention of observer(s) to the object(s)?
- (b) Angle of elevation and azimuth of the object(s). When first observed.
- (c) Angle of elevation and azimuth of object(s) upon disappearance.
- (d) Description of flight path and maneuvers of object(s).
- (e) Manner of disappearance of object(s).
- (f) Length of time in sight.

(3) Manner of observation:

(a) Use one or any combination of the following items: Ground-visual, ground-electronic, air-electronic. (If electronic, specify type of radar).

(NOTE: Air-visual would be applicable here to the air-borne observer).

(b) Statement as to optical aids (telescopes, binoculars, and so forth) used and description thereof.

(c) If the sighting is made while airborne, give type aircraft, identification number, altitude, heading, speed, and home station.

(4) Time and date of sighting:

(a) Zulu date-time group of sighting:

(b) Light conditions (use one of the following terms): Night, day, dawn, dusk.

(5) Locations of observer(s). Exact latitude and longitude, or Georef position, or position with reference to a known landmark.

(6) Weather and winds-above conditions at time and place of sightings:

(a) Ceiling.

(b) Visibility.

(c) Amount of cloud cover.

(d) Thunderstorms in area and quadrant in which located.

(7) Any other unusual activity or condition, meteorological, astronomical, or otherwise, which might account for the sighting.

(8) Interception or identification action taken.

(9) Existence of physical evidence, such as materials and photographs.

While the above format should be used in reporting unidentified flying objects, there are other details which are helpful to the observer in identifying the flying object, or in reporting its characteristics.

These include:

(1) Relation of the size of the object to the size of the moon or the sun.

(2) Various types of sound, such as rumbling, whining, humming, swishing, explosive, or jet or rocket-type sound.

(3) Color may be described in terms of the color spectrum, with additional details to indicate metallic or luminous characteristics.

(4) Speed may range from a stationary or hovering position to 100 to 400 miles an hour, or to a speed similar to that of a meteor.

(5) Shape may vary from that of a conventional aircraft to that of an unconventional aircraft and may be described as elliptical or disk-shaped, cigar-shaped, propeller-shaped, conical, rocket-like, meteor-like, or having the characteristics of tails of flame or fire.

(6) Light brightness may be described in terms of dullness or brilliance, by comparison to moonlight, or to the reflection of sunlight on various metals, such as aluminum, or a mirror, or on dull surfaces such as stone or plaster.

(7) The degree of brightness may be related to the apparent distance of the object.

(8) Angular velocity, that is, speed measured in degrees, may vary from zero through very slow, slow, moderate, rapid, very fast, extremely fast (90 degrees per second) to more than 90 degrees per second.

(9) Angular acceleration, or change in angular velocity, may increase or decrease slowly, fast, or very fast.

## SUMMARY

The various manifestations that are created by meteorological, astronomical, physiological, or psychological phenomena have been discussed with the intent of assisting the aircrew member in observing and reporting unfamiliar flying objects.

To date, the flying objects reported have imposed no threat to the security of the United States and its possessions. However, the possibility that new air vehicles, hostile aircraft, or missiles, may first be regarded as unfamiliar flying objects by the initial observer is real.

The United States Air Force is charged with the responsibility of safeguarding the United States and its possessions, as well as US forces abroad, from any threat that may arise from the air. In order to discharge this responsibility, it is imperative that all unfamiliar flying objects be reported accurately, so that identification may be made through subsequent investigation.

Current Air Force regulations outline the procedures for reporting unfamiliar flying objects. However, it is believed that a clearer understanding of many natural phenomena, and of how to recognize the conditions under which they occur, will add to the validity of subsequent reports.

|             |  |
|-------------|--|
| ROUTING     | COORDINATION   |
| AFOIN-4     | AFSOC, HQS 4602d AISS (ADC), 25 Apr 57, Subj: UFOB Guidance Mater  |
| AFOIN-4E4   | 1st Ind 4E4/Capt G.T. Gregory/vm/69216   |
| AFOIN-4X2b  | AIR TECHNICAL INTELLIGENCE CENTER, Wright Patterson Air Force Base, Ohio 21 MAY 1957   |
| AFOIN-4X2c  | TO: Commander, 4602d Air Intelligence Service Squadron (ADC), Ent Air Force Base, Colorado Springs, Colorado   |
| AFOIN-4X3   | 1. This Center is currently in process of preparing subject guidance material requested, and should be forthcoming within two weeks of this date.  |
| AFOIN-4X4   | 2. The known difficulty in attempting to provide guidance material on such a complex subject as UFOs, and this Center's desire to present, in a simple manner, the numerous clues, hints, leads and indications to assist both field investigators and lay observers in evaluating and explaining UFO sightings, dictates that the matter be approached properly.  |
| AFOIN-4B    | 3. Additional research and data is required on all the possible effects that various objects (aircraft, balloons, astronomical bodies, etc) can produce under certain conditions. For example, in a study of UFO reports which indicate binoculars were used at night, there is almost invariably the statement "flashing, erratic or zig-zagging" movements of the UFO. While the reason is obvious to those involved in UFO analyses, the fact that binoculars, focused on a star, planet or moving spot of light, will produce these precise movements if hand-held is often not considered even by experienced intelligence and interrogating personnel. Also, the fact that a large number of weather and research balloons carry lights, which can produce unusual appearances and maneuvers at night, is generally unknown to many. |
| AFOIN-4C    | 4. It is suggested that the numerical guidance items under each subject item of an appendix, be followed with a brief, informal commentary on other effects, appearances and maneuvers of each object under given conditions. The material being prepared is designed with this view in mind, and may be used as deemed necessary to your particular requirements.   |
| AFOIN-4D    | 1 4E4 2T Gregory FOR THE COMMANDER<br>2 4E4 2T Gregory 20/5/57<br>3 4E 11  |
| AFOIN-4F    | Incl n/c   |
| OTHERS      | <i>for Clegg 20/5/57</i>   |
| VIAFOIN-4X1 | <i>for Clegg 20/5/57</i>   |

T. J. CONNAIR, JR.  
MAJOR, USAF  
C-17

2

|         |
|---------|
| PERM    |
| TEMP    |
| 90 DAYS |
| INITIAL |

25 Apr 1957

AISOC

SUBJECT: UGOB Guidance Material

TO: Commander  
Air Technical Intelligence Center  
ATTN: AFOIN-4E4  
Wright Patterson Air Force Base  
Ohio

1. Reference is made to the conversation, 17-18 Apr 57, between Captain Gregory, your center, and A/1C Barth, this organization, concerning UGOB guidance material.

2. In accordance with the views expressed by Captain Gregory, this organization will publish a change to 4602d AISS Squadron Guide 200-2 on/about 1 June 1957.

3. The material to be incorporated into this change includes:

a. An expanded section on meteors, drawn primarily from your letter, AFOIN 4E4, Subject: UGOB Guidance Material - Meteors and Meteoric Showers, dated 14 Nov 56.

b. A new section on Radar Scope UGOBs, including the article from "Electronic Week", which your center forwarded to this organization, and an explanation of Anamalous Propagation.

c. An expanded section on balloons.

4. In order to assist this organization in accomplishing this change, request your center prepare:

a. A discussion on Anamalous Propagation.

b. Any information on balloons which your center deems appropriate for inclusion in the change.

c. Possible suggestions for expanding any of the other sections of Appendix "A", Squadron Guide 200-2, a copy of which is attached.

FOR THE COMMANDER:

/s/ RICHARD B. RANDLE  
Major, USAF  
Asst Adjutant

1 Incl  
App A, SG 200-2

HEADQUARTERS  
UNITED STATES AIR FORCES IN EUROPE  
Office of the Deputy Chief of Staff, Intelligence

SEP. 30. 1957

APO 633, New York, N.Y.

Major General Millard Lewis  
Assistant Chief of Staff, Intelligence  
Headquarters, United States Air Force  
Washington 25, D.C.

Dear Chief:

Please find attached copies of our publication on unidentified flying objects. Over the past several years all of us in this business have been concerned, directly or indirectly, with this subject. In fact, even here in Europe we are plagued by reports from even our own people which are so poorly rendered that we cannot make head nor tail out of them.

This booklet was published and intended to be used as a training aid and reporting guide. As stated in the first pages, there is no intent to discourage reporting, but rather to acquaint the observer with what he may actually be looking at. We find it mighty discouraging when air crews with thousands of hours to their credit make fantastic reports of what we often know to be natural phenomena.

Other publications may have been prepared in the past by other agencies, but a thorough search by my people failed to locate any real usable aid.

The thought occurs to me that this could well be only the first step in acquainting our people with this sort of thing, and that perhaps ATI could, for example, develop a system of colored slides to be used in a course of instruction on the subject. Perhaps it should be included as a part of our flying training instruction, and it might also be of use to ADC in assisting their Ground Observer Corps. On the other hand, considering reports which we have all seen from commercial air lines people we might make money by offering something of this nature to them.

I hope that in this year of austerity we have not duplicated anyone else, and would appreciate your reaction to the booklet and the suggestions made herein.

DCS/INTEL.. IDC-DC  
CONTROL NUMBER 5 .. 09700 Sincerely,

1 incl: Booklet (10 cys)

C. C. ROGERS  
Colonel USAF  
DCS/Intelligence

*Booklet*

| COVER SHEET   |        |     |    |        |      |    |        |     |    | SUSPENSE                |     |    |          |          |
|---|--------|-----|----|--------|------|----|--------|-----|----|-------------------------|-----|----|----------|----------|
| ORIGIN OF BASIC   |        |     |    |        |      |    |        |     |    | DATE                    |     |    |          |          |
|   |        |     |    |        |      |    |        |     |    | ASSIGNED BY             |     |    |          |          |
| DATE  |        |     |    |        | TYPE |    |        |     |    | NO.                     |     |    |          |          |
| SUBJECT   |        |     |    |        |      |    |        |     |    |                         |     |    |          |          |
| AIDS TO IDENTIFICATION OF FLYING OBJECTS  |        |     |    |        |      |    |        |     |    |                         |     |    |          |          |
| ROUTING   |        |     |    |        |      |    |        |     |    |                         |     |    |          |          |
| <small>Initial "IN" column to denote review prior to action. Initial "OUT" column to denote review of completed action. (X for action; ✓ for coordination.)</small>   |        |     |    |        |      |    |        |     |    |                         |     |    |          |          |
| IN  | OFFICE | OUT | IN | OFFICE | OUT  | IN | OFFICE | OUT | IN | OFFICE                  | OUT | IN | OFFICE   | OUT      |
|   | OIN-1  |     |    | OIN-2  |      |    | OIN-3  |     |    | OIN-4                   |     |    | AFOIN    |          |
|   | OIN-X  |     |    | OIN-2X |      |    | OIN-3X |     |    | OIN-AX                  |     |    | AFOIN-X  |          |
|   |        |     |    |        |      |    |        |     |    |                         |     |    | AFOIN-X  |          |
|   |        |     |    |        |      |    |        |     |    |                         |     |    | AFOIN-X1 |          |
|   |        |     |    |        |      |    |        |     |    |                         |     |    | AFOIN-X2 |          |
|   |        |     |    |        |      |    |        |     |    |                         |     |    | AFOIN-X3 |          |
|   |        |     |    |        |      |    |        |     |    |                         |     |    | AFOIN-XA |          |
|   |        |     |    |        |      |    |        |     |    |                         |     |    | AFOIN-X5 |          |
|   |        |     |    |        |      |    |        |     |    |                         |     |    | AFOIN-Z  |          |
|   |        |     |    |        |      |    |        |     |    |                         |     |    | CABLES   |          |
|   |        |     |    |        |      |    |        |     |    |                         |     |    | M        | FILE     |
|   |        |     |    |        |      |    |        |     |    |                         |     |    | B        | DISPATCH |
|   |        |     |    |        |      |    |        |     |    |                         |     |    | R        |          |
| TO:<br>AFCIN-4X ATTN: Mr. Arcier  |        |     |    |        |      |    |        |     |    | DATE<br>10 Oct 57       |     |    |          |          |
| FROM:<br>AFCIN-XIA  |        |     |    |        |      |    |        |     |    | COMMENT NO.<br>1        |     |    |          |          |
| COMMENTS (use reverse, if necessary)  |        |     |    |        |      |    |        |     |    | Mr. Sanderson/pah/74903 |     |    |          |          |
| <p>1. The attached copy of letter from USAFE with inclosure "Aids to Identification of Flying Objects" is forwarded for your comments on which to base a reply.</p> <p>2. Request comments be directed especially to the accuracy and sufficiency of material therein as well as its possible use by other agencies and the general public.</p> <p>3. Request <sup>reply</sup> NLT 25 October 1957, in order that General Lewis' reply to Col. Rogers be prepared promptly.</p> |        |     |    |        |      |    |        |     |    |                         |     |    |          |          |
| <p style="text-align: right;"><i>Norman N. Perlberg</i><br/> <b>NORMAN N. PERLBURG</b><br/>         Lt Colonel USAF<br/>         AFCIN-XIA</p>  |        |     |    |        |      |    |        |     |    |                         |     |    |          |          |
| Incl.   |        |     |    |        |      |    |        |     |    |                         |     |    |          |          |
| <p>1. Ltr to Gen. Lewis fr Col Rogers 30 Sept 57<br/>         2. Booklet</p>  |        |     |    |        |      |    |        |     |    |                         |     |    |          |          |

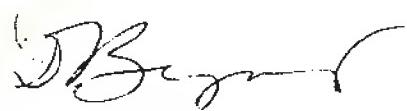
MEMORANDUM TO CAPTAIN GREGORY

18 Oct 1957

The data included in the radar portion is correct (with one exception), there is a great deal of information which should be included but which is not there. Some explanation regarding returns due to anomalous propagation which appear as very fast moving targets should be included, since this is one of the principal types of radar reports received.

It should be emphasized that this task would require a respectable effort, and couldn't be dashed off in a matter of a few minutes to meet a short deadline. Some good scope photos of actual anomalous propagation and samples of interference from other radars, returns from clouds, etc, would appear to be more informative than the diagrams and scope sketches showing normal and abnormal propagation which are in the article.

The exception noted in the first paragraph is to the statement that an interfering radar will give one or two returns on the scope. Actually there will usually be many times this many - hundreds of them, in fact. It is true that they are usually easily recognizable.



V. D. BRYANT  
AFCIN-4Ela

SUBJECT: Aids to Identification of Flying Objects

TO: AF CIN-4X2A

FROM: AF CIN-4

24 OCT 1957

Comment Nr. 2

454/Capt G.T. Gregory/  
wm/69216

1. Attached publication, prepared for the most part from Project Blue Book, AFR 200-2 and other pertinent guide material originally prepared by this Center, is a commendable effort towards the philosophy enunciated in the D/I-ATIC conferences last spring; that all USAF units be given guides and assistance to properly identify seemingly unidentifiable aerial objects.

2. Up to this time, the only aids to UFO investigation and field analyses have been given to AISS and GOC units (See inclosures 3 and 4, "UFO Guide" now being revised, and GOC "UFO" Poster).

A complete review and revision of subject publication would require a respectable effort, which cannot be accomplished within the deadline given in par. 3 of preceding comment. However, a review has disclosed the omission of certain key points, significant clues and leads to UFO identification, and other explanatory items. A number of items were revised; others were clarified. A number of illustrations are submitted to properly clarify or explain key phenomena (Figures 1 through 11). (See inclosure 5, detailed review and suggested revisions.)

3. It would have been more desirable if a draft of the publication had been submitted to the Center for review and corrections, assuming the guide in question is a "final publication item". If not, then it is suggested that it be recommended to USAFE that the revisions, additions and illustrations submitted here be incorporated into the proposed final publication.

4. The UFO guide and GOC poster (inclosures 3 and 4) may also be submitted to USAFE, and should include the original UFO guide prepared for Air Force units "How to make UFLYBRPTS", attached (inclosure 6) both for possible use in the USAF guide and to demonstrate that the Air Force has not been remiss in UFO material and publications as the letter from USAFE appears to indicate.

- Inc's
1. Ltr to Gen Lewis fr USAFE
  2. UFO Guide Booklet
  3. UFO Guide - Rough Draft
  4. GOC Poster
  5. Suggested Revisions to UFO Guide  
w/2 illustrations
  6. ATIC Guide "How to Make UFLYBRPTS"

Major W. E. Wood  
Capt, USAF  
AF CIN-4X2a

Air Technical Intelligence Liaison Office

SFITI

5 NOV 1957

SUBJECT: Information Requested by JASDF

TO: Director  
Air Technical Intelligence Center  
ATTN: AFCIN-4E4 (Capt Gregory)  
Wright-Patterson Air Force Base, Ohio

During a course of training given to JASDF (Japan Self Defense Force) intelligence personnel on ATI training, considerable interest was shown on the subject of unidentified flying objects. Request any unclassified reports published by ATIC on this subject which could be given to JASDF personnel.

JACK S. ZEIGLER  
Lt Colonel, USAF  
Director, ATILC  
DCS/Intelligence

18 Nov 25 10 38

21 NOV 1957

Colonel Craven C. Rogers  
 Deputy Chief of Staff, Intelligence  
 Headquarters, U. S. Air Forces in Europe  
 APO 633  
 New York, New York

Dear Buck,

Reference your letter of 30 September, forwarding copies of your booklet on "Aid to Identification of Flying Objects", ATIC reviewed the booklet and felt it was a commendable effort toward solving one of our UFO headaches. However, they felt it would have been more advantageous to you if it had been reviewed by them before publication. It seems that the philosophy of the UFO's has changed since the publication of Project Blue Book and other earlier material. Their review disclosed the omission of certain key points, significant clues and leads to UFO identification, and other explanatory items.

We are in the process of revising AFR 200-2 in order to incorporate some of these new ideas, and to delineate responsibilities for various aspects of the UFO program.

I am sending along for your information the material prepared by ATIC regarding your booklet.

- 4 Incls
1. UFO Guide - Rough Draft
  2. GOC Poster
  3. Suggested revisions to  
UFO Guide w/12 illustrations
  4. ATIC Guide "How to Make UFLYERPTS"

FRANK B. CHAPPELL  
 Colonel, USAF  
 Office, Assistant Chief of Staff,  
 Intelligence

COORDINATION:  
AFCIN-XI  
 Col Hurley  
 L/Col Perlberg  
 Mr. L. Sanderson

Coord cy  
 ACS Cross ref  
 Comeback  
 XI Stayback

File in UFO  
 Folder

| EMO ROUTING SLIP                               |                        | NEVER USE FOR APPROVALS, DISAPPROVALS,<br>CONCURRENCES, OR SIMILAR ACTIONS |  |
|--|------------------------|--|--|
| NAME OR TITLE<br><i>Col. Jack Witz</i>         | INITIALS<br><i>XWS</i> | CIRCULATE  |  |
| ORGANIZATION AND LOCATION<br><i>AFGIN - 4B</i> | DATE                   | COORDINATION   |  |
|  |                        | FILE   |  |
|  |                        | INFORMATION  |  |
|  |                        | NECESSARY ACTION   |  |
|  |                        | NOTE AND RETURN  |  |
|  |                        | SEE ME   |  |
|  |                        | SIGNATURE  |  |

## REMARKS

*cc: GAO, LBN to confirm my theory.  
Reference our recent private discussion  
re your theory that the UFO hysteria  
could be used as a deniable - clever  
psychological warfare weapon to  
entirely disrupt the Air Force*

*Attached is my ex-chief and friend,  
under whom I served in a civilian  
capacity here in ATCC, and now  
an attaché, England.*

*The letter is personal. However,  
its remarkable how his general viewpoint  
of the situation parallels yours on almost*

|   |                           |
|---|---------------------------|
| FROM NAME OR TITLE<br><i>Col. Gregory</i>       | DATE<br><i>25 Nov 58</i>  |
| ORGANIZATION AND LOCATION<br><i>AFCI (West)</i> | TELEPHONE<br><i>67206</i> |

DD FORM 1 FEB 60 95 Replaces DA AGO Form 406, 1 Apr 48, and AFHQ Form 12, 10 Nov 47, which may be used. 16-48487-4 APO ★

|            |   |
|------------|---|
| ROUTING    | COORDINATION  |
| AFOIN-4    | SFITI, Hq Fifth Air Force, 5 Nov 57, Subj: Information Requested by<br>JASDF  |
| AFCIN-4E4  | 1st Ind 4E4/Capt G.T. Gregory/wm/69216  |
| AFOIN-4X2b | AIR TECHNICAL INTELLIGENCE CENTER, Wright Patterson Air Force Base,<br>Ohio   |
| AFOIN-4X2c | TO: Commander, Fifth Air Force, MTIN: SFITI, APO 925, San Francisco,<br>California  |
| AFOIN-4X3  | 1. Attached is a draft copy of a proposed "Identification to Flying Objects" which this Center is in the process of preparing, editing and revising. For purposes of expediency, a copy of the "suggestions and revisions sheet", and illustrations to be added to the draft are forwarded.   |
| AFOIN-4X4  | 2. Because of current budgetary limitations and manpower restrictions, publication and dissemination of the proposed guide on a USAF-wide basis within the near future is unlikely. Therefore, the material may be used as a "master" for the preparation of a document or guide to be assembled by your office in any format desired or as dictated by the requirements of the Japanese Air Defense Command. |
| AFOIN-4B   | 3. Also attached is Department of Defense and other material reflecting the work, findings and other aspects on the Air Force "UFO Program". This, together with the aforementioned guide, should provide all basic data necessary for training, indoctrination or informative purposes.  |
| AFOIN-4C   |   |
| AFOIN-4D   | Incls<br>1. Cy, "Aids to Ident of UFOs"<br>2. Suggested Revisions w/11 Illus<br>3. USAF Questionnaire<br>4. DOD Release<br><i>1 4E4, R1<br/>2 4E4, R1<br/>3 4E 17R<br/>Wiley 25 Nov. 57</i>   |
| AFOIN-4E   |   |
| 1 4E4, R1  |   |
| 2 4E4, R1  |   |
| 3 4E 17R   |   |
| AFOIN-4F   |   |
| OTHERS     | <i>4x1 Attached</i>   |

DRAFT - UFD & VIDEO  
T.O. FEAF

CLASS: \_\_\_\_\_  
OFFICIAL FILE COPY

OFFICE OF RECORD

ROUTING AND COORDINATION SHEET

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| INITIAL |  |

SUGGESTED REVISIONS AND ADDITIONS TO UFO AID

Page 1

DEFINITION: Insert, after 2nd paragraph: "unidentified aircraft" are not within this definition of unidentified flying objects; hence should not be a basis for the submission of UFO reports within the meaning of AFR 200-2. The reporting of "unidentified aircraft" usually results from the sighting of an aircraft which is readily identifiable as an aircraft, but whose origin, type, purpose, destination, etc. may not be known. These are the responsibility of air defense and other pertinent units, and should be "screened" or "filtered" out from the UFO reporting system. This should include jet exhausts, parachute flares, condensation trails, navigation lights or other phenomena known to originate from aircraft or aircraft operations, although the aircraft themselves may not be immediately identified. These "unidentified" familiar objects are not "UFOs".

Page 3

BALLOONS: 2nd paragraph, 5th line: Change "one hundred feet" to read "two hundred feet".

After 2nd paragraph, insert separate paragraph substantially as follows: The majority of balloons released at night carry one or more "running lights", which often contributes to weird or unusual appearances. Many balloons carry metallic, triangular shaped "corner reflectors" suspended some distance below the balloon proper (Fig. 1). Larger, research types, may rise considerable distances before becoming fully inflated, and may often be flattened on top until completely expanded (See Fig. 2). Partially inflated balloons may be caught in

jet streams; assume near horizontal positions, and move with considerable speed. Encountering a flat, circular object (balloon flattened on top) under darkness or adverse weather conditions, arising from below can be startling even to experienced pilots.

Separate paragraph: Balloons can be observed when the sun is behind the horizon and the earth is in comparative darkness (See Fig. 3). This has resulted in a considerable number of UFO reports over the last ten years. The two general "clues" here is that a. the sighting usually is observed just before dawn or little after sunset and b. the shape of the UFO appears either as "disc" or "spherical" and bright reddish-orange, pink, or reddish-white. The coloration is caused by the sun's slant rays reflecting off the balloon's surfaces.

Page 4 ASTRONOMICAL BODIES: Separate paragraphs substantially as follows: Meteors will appear to vary in shape from round to elongated, teardrop in shape, and in size from tiny pinpoints to the size of the moon. Colors will range from yellowish-white through red, blue and green hues depending on the atmosphere.

Although observed singly, meteors may be observed in clusters. The time in sight is generally less than 10 seconds. Although improbable that meteoric bodies themselves can be picked up on radar, the meteor trails are generally good reflectors and will often "paint" on radarscopes.

An extremely brilliant, rarely seen form of meteorite is called a "fireball". Fire balls, unlike ordinary meteorites do not burn

themselves out in the upper atmosphere, but persist into the lower levels crashing into the earth's surface. A fireball that explodes before reaching the earth's surface is usually referred to as a "bolide". An encounter with a fireball during darkness can be a frightening experience, as these bodies can suddenly illuminate the surroundings with a dazzling, daylight intensity.

Conclude with (separate paragraph): It has been repeatedly proved that attempting to observe objects later found to be stars, planets or other apparently fixed celestial bodies, through hand-held binoculars or glasses will often give an illusion of unusual maneuvers, trajectories and speeds. This is particularly true when such bodies are observed under adverse sky or weather conditions.

Page 5  
and 21  
RADAR SIGHTINGS: Comment: The summary section (page 5) and the detailed Section III (page 21) gives the impression that unidentified objects observed on radarscopes are primarily the result of temperature inversions and other meteorological causes. The following, in substance, should be integrated, as desired, into both sections:

1. "Spurious" blips or returns may also be caused by
  - a. Mutual interference between radar units
  - b. Jamming
  - c. Unknown malfunctioning of equipment
  - d. Radar target simulators
2. Even experienced radar operators can err in interpreting radar returns. This is particularly true when operating personnel from radar units located in stable-weather areas are assigned to

localities subject to unusual, turbulent or suddenly changeable weather conditions. Such conditions are generally conclusive to anomalous propagation (See Fig 4 and 5).

3. Ten years experience in the investigation and analyses of the UFO phenomena reported by radar units, has disclosed numerous instances where both airborne and ground radar units have observed what apparently were objects in the air, and found to have actually been ground objects. This was caused by temperature inversions (See Figs 7, 8 and 9).

Page 8 NEW FLYING OBJECTS: Suggest 1st paragraph be changed to read: There are two new radar aircraft now in existence which to the uninitiated may appear as unidentified flying objects or so-called "flying saucers", because of saucer-shaped radar antennas that are affixed to their fuselage (See Fig 6 - WF-2 Radar Aircraft, and the radar Super Constellation).

Page 9 It should be strongly emphasized that many swept-back and delta-wing aircraft can appear as weird and unusual flying objects, particularly when observed under adverse weather or light conditions (See Figs. 10 and 11, Block of Aircraft Photos). The Air Force is in daily receipt of UFO reports describing "flying saucer" objects, which upon investigation are found to be aircraft of the configuration discussed here.

Page 16 METEORS: 1st paragraph, 5th line. Change "24,000,000 meteors" to read "approximately 200,000,000 meteors."

Add separate paragraph on "annual meteoric showers", substantially

as follows: Each year the earth passes through certain meteoric showers at specific times each year, which invariably results in a large number of UFO reports. These annual showers can be exceptionally brilliant, having thousands of meteors and meteor trails. Some of the most prominent of these are the Perseids (August), Orionids (October) and the Leonids (November). The Leonids, for example, which last for approximately 7 days and reaches its maximum about November 16, has provided close to 200,000 meteors between midnight and dawn. Any good astronomical text will furnish the dates and schedules of these periodical showers.

Page 23  
Partial paragraph continued from page 22, should read "... may cause the appearance of two or more targets on the radar screen. In some instances hundreds of returns may appear.

DRAFT JEW GUIDE  
TO - U.K.

FILE CLASS: \_\_\_\_\_  
OFFICIAL FILE CC

OFFICE OF RECORDS

12 FEB 1958

AFCIN-4X2b AFCIN-4E4

SUBJECT: (U) Aids to Identification of Flying Objects

AFCIN-4X2c TO: Office of the Air Attaché  
ATTN: Col R.W. McDuffee  
U.S.N., P.P.O. 100  
New York, New York

1. Attached is a draft copy of a proposed "Identification to Flying Objects" which this Center is in the process of revising. For purposes of expediency, a copy of the "suggestions and revisions sheet", and illustrations to be added to the draft are forwarded.

2. Subject material is forwarded in accordance with an informal request made to Captain Gregory of this Center. The material is similar to that used by Headquarters USAFE for the identification of UFOs and recently revised by this Center.

3. Because of current budgetary limitations and manpower restrictions, publication and dissemination of the proposed guide, on a USAF-wide basis, within the near future is unlikely. Therefore, the material may be used as a "master" for the preparation of a document or guide to be assembled by your office in any format desired or as dictated by the requirements of your organization or operations.

4. It should be stated, as a matter of guidance, that a large number of UFO reports submitted from overseas commands and facilities could have been resolved on the spot, by a check and investigation of all pertinent local facilities, and conducting a preliminary field analysis as prescribed in par. 5, AFR 200-2.

5. Also attached is Department of Defense and other material reflecting the work, findings and other aspects on the Air Force "UFO Program." This, together with the aforementioned guide, should provide basic data necessary for training, indoctrination or informative purposes.

FOR THE COMMANDER

WALLACE W. ELWOOD  
Captain, USAF  
Assistant Adjutant

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What 2/11/58

AFCIN-4E

ROUTING AND COORDINATION SHEET

OTHERS

4 Incls

1. Cy, "Aids to Ident of UFOs"
2. Suggested Revisions v/11
3. Illus
4. USAF Questionnaire
5. DOD Releases